PUBLIC

IN THE MATTER OF AN ARBITRATION UNDER CHAPTER ELEVEN OF THE NORTH AMERICAN FREE TRADE AGREEMENT AND THE UNCITRAL ARBITRATION RULES

BETWEEN:

MESA POWER GROUP, LLC

Claimant

AND:

GOVERNMENT OF CANADA

Respondent

Witness Statement of Rick Jennings

February 28, 2014

Department of Foreign Affairs, Trade and Development
Trade Law Bureau
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I. Introduction

1. My name is Rick Jennings. I was born on [redacted] and I currently live at [redacted] Avenue in the city of Toronto, Ontario, Canada. I am an Assistant Deputy Minister at the Ontario Ministry of Energy and am the head of the Energy Supply Division.

2. I am a professional engineer by training holding a bachelor's degree in industrial engineering as well as a master's degree in business administration, both from the University of Toronto.

3. I joined the Ministry of Energy in 1981 and between then and 2005 I held progressively more responsible positions within the Ministry related to energy economic and regulatory issues. Since 2005, I have been an Assistant Deputy Minister in the Ministry.

4. Over the course of my time as Assistant Deputy Minister, I have been responsible for advising the Government of Ontario on matters related to general electricity policy, the legislative and regulatory framework related to electricity generation, transmission, and distribution, as well as policy related to natural gas supply and oil and refined petroleum products. As a result, I have been involved in initiatives in numerous areas including: electricity pricing; nuclear procurement and regulation; electricity supply procurement and contracting; transmission planning; the Ministry's Long Term Energy Plans in 2010 and 2013; Ministerial supply directives to the Ontario Power Authority ("OPA"); as well as energy trade and environmental issues. I have reviewed the witness statement being filed by Sue Lo in these proceedings, and agree with how she has described these various initiatives. I will not repeat what she has already explained to the Tribunal. I provide this witness statement to offer some

background on the particular system planning issues that arose in the context of Ontario's recent policies with respect to renewable energy procurement.

II. Fundamentals of Electricity System Planning

5. Electricity system planning is about balancing and integrating four separate technical areas: electricity generation, transmission, distribution and demand (or what is technically known as "load"). The challenge of electricity is that unlike other goods or services that may be procured by a government, electricity, once generated, must be simultaneously transmitted and consumed. It cannot simply be stored away in a warehouse waiting for transmission capacity to become available or for demand to require it to be brought out of mothballs. Thus, as anyone familiar with the industry knows, there is always a constant need to instantaneously balance supply and demand. Electricity generation procurements are designed to recognize this fundamental technical limitation.

6. In addition, as anyone with an understanding of the electricity system would appreciate, electricity system planning must be flexible enough to adjust to changes. Industry participants are all well aware of the fact that electricity system planning must be responsive to external events and changes. Electricity system planning is particularly sensitive to such changes because the generation and transmission infrastructure generally takes so long to construct. The most obvious changes that electricity systems must address are fluctuations in supply (generation) and demand (load). On the supply side, every source of electricity generation has different physical characteristics and every generation facility has a different lifespan. On the demand side, while populations might be expected to grow, ensuring that demand generally increases over time, where it grows and how fast are variables that are difficult to predict. Even more difficult to

account for is the significant impact that economic downturns and upturns have on electricity demand, particularly from heavy commercial and industrial consumers.

7. With these challenges in mind, in electricity system planning, it is critical that operational requirements are addressed and a high level of reliability is achieved and maintained. In addition, the costs of electricity must be maintained at reasonable levels for residential and institutional customers and at levels competitive with other jurisdictions for commercial and industrial customers. Another important goal is for electricity generation to be sustainable. In our electricity system planning, we seek to balance these three fundamental goals: reliability, cost, and sustainability.

8. There are particular challenges meeting these goals with respect to renewable energy generation. In this respect, I note that the green energy initiatives adopted by the Government and the related transmission projects to bring them into service were ambitious. In fact, they were the most ambitious in North America. As one would expect, some of that initial ambition and exuberance had to be reined in as the program developed and the world around the program changed. Such changes are inevitable – such adaption is neither unusual nor surprising. Rather, such adaptation is necessary if the electricity system is to function reliably, cost-effectively and sustainably.

A. Reliability

9. Electricity demand in Ontario follows a daily pattern of a minimum load in the middle of the night, rising beginning around 6 a.m. to a daily peak in mid-afternoon in the summer and early evening in the winter. On certain days the load can increase as much as 10,000 MW between overnight low and daily peak. During spring and early fall when there is little or no

cooling or heating load overnight, Ontario demand can fall to as low as 11,000 – 12,000 MW, although daily peaks can still reach 20,000 MW.

10. Ontario, unlike many other electricity systems, experiences high seasonal demand in both the summer and the winter because there is both a high cooling load and a high heating load. Ontario is now summer peaking (the highest all-time Ontario summer peak was just over 27,000 MW set in August 2006) but also has a high winter load (the highest all-time winter peak was just under 25,000 MW set in December 2004).[1] This demand pattern ensures that system planning and outage and maintenance coordination is more complex for Ontario than it is for other systems that are primarily winter peaking or summer peaking.

11. Electricity system planning and procurement initiatives need to ensure that light bulbs, motors and appliances can operate reliably as demand fluctuates throughout the day, changes from season to season, and during periods of the highest demand (known as peak load). The system must be planned so as to ensure that there is sufficient generation capacity that is available to operate at peak demand times. This requires understanding what the peak meeting capability of each generation source is and providing for a reserve margin (18 -20 percent depending on the system and generation characteristics) on top of peak demand to allow for forced outages and maintenance. Nuclear, natural gas, coal and certain hydro generation facilities have a high level of peak meeting capability. In some cases, 90 percent of their total rated "nameplate" capacity can be counted on for peak and reserve margin planning purposes.

[1] Electricity demand in Ontario can be found at the website of the Independent Electricity System Operator: www.ieso.ca.

12. However, renewable energy sources pose unique challenges in terms of reliability and system operability. For example, wind is not a constant resource throughout a day, and it certainly varies greatly across days, weeks and seasons. Wind resources are intermittent and are not able to increase in response to increases in demand. You cannot make the wind blow just because it is a hot day and everyone in Toronto has turned on the air conditioning. As a result, those familiar with the industry know that operational challenges increase significantly as the proportion of a system's electricity that is generated by intermittent renewable technologies increases beyond 10-15 percent.

13. Over a year, wind capacity built in a location with a good wind regime should be capable of generating an average of 30 percent of its nameplate capacity in electricity output. However, in terms of its ability to meet demand during any given hour, such as during peak demand periods, the capability of wind resources is considered to be at best 10-15 percent of nameplate capacity for planning purposes. Significant operational challenges also arise from wind output declining during the time of the day (early morning) that demand is increasing. Similarly, wind output generally increases as demand drops off in the evening and night.

B. Cost-Effectiveness

14. Ensuring that an electricity system is cost effective requires balancing different generation technologies, each with their own cost and performance characteristics. In every electricity system (unless it is heavily subsidized by the government) electricity customers or ratepayers ultimately have to pay for generation, transmission, and distribution or else the system is underbuilt and they have to cope with rotating outages.

15. Electricity generation technologies vary significantly in cost. Generally there is a trade-off between capital costs and fuel and operating costs. Certain forms of electricity generation are relatively capital intensive but have relatively low fuel and operating costs, while others may have lower capital costs but have higher fuel and operating costs. By way of example, while the capital costs of nuclear facilities are high, they have low fuel costs and produce large quantities of reliable electricity for long periods of time. It is because of these features that nuclear power has been relied on as the primary base load generation source in Ontario, i.e. a source that can be relied upon to meet the minimum continuous load at all times. Nuclear capacity also has a high level of peak meeting capability.

16. Another element of cost is related to transmission and distribution systems. Traditionally, the system has relied on large generation centres (e.g. nuclear reactors, large hydro dams, coal facilities) which for reasons of geography, land costs, safety, pollution and security are located far away from the load centres. For instance, in Ontario the Bruce nuclear facilities that have historically provided a significant source of base load electricity generation capacity are located more than 175 km from the main load centres in south-western Ontario (in and around the Greater Toronto area and Hamilton). An integrated transmission system including expensive high voltage transmission lines is required to transfer the electricity from large generation centres to high load centres.

17. In Ontario, renewable energy generation technologies pose particular cost-effectiveness challenges. The prime resources are located far from load centres, requiring extensive investment in low voltage distribution systems and expensive high voltage transmission systems. In addition, high capital costs and the intermittent nature of production typically mean that very high contract purchase prices have to be offered to wind and solar developers to provide

commercial rates of return. In the FIT Program, which was being implemented during an economic crisis, rates of $135/MWh for wind and between $400 and $800/MWh for solar (depending on size) were initially set in 2009.

18. Ultimately, there was more interest in the FIT Program than expected, and these high prices and the high take up of wind and solar projects put significant upward pressure on electricity prices. As high electricity prices became a major issue with residential customers and with industry and potential industrial investors, the impact on costs and economic activity of an open ended procurement of wind and solar had to be revisited. In particular, the original *Green Energy and Green Economy Act, 2009* framework of continually building out the transmission and distribution systems to accommodate increasing amounts of renewable generation had to be modified to take account of the cost and timelines required for new transmission investment as well as additional generation costs. The *2010 Long-Term Energy Plan* modified this framework by establishing a limit of 10,700 MW by 2018. In the *2013 Long-Term Energy Plan*, this target was moved out to 2021.

C. Sustainability

19. Increasingly, electricity system planning has aimed to ensure that generation supply is diversified and sustainable. While often taken to focus exclusively on environmental sustainability, an electricity system must also be sustainable from an economic and operational perspective as well as being resilient to various impacts and changes. Increasingly, public acceptance or social licence is critical to determining whether projects are able to be approved and constructed.

20. In 2004 the Government of Ontario committed to phase out coal fired electricity generation by 2007 (this was subsequently modified to 2009 and ultimately to 2014 to recognize the need to ensure reliability). Coal had accounted for 10,000 MW of capacity and had made up 23 percent of generation in 2004. Coal generation was reduced by procuring new natural gas capacity, returning to service some idled nuclear plant capacity, and procuring renewable sources of electricity. This decision to eliminate coal burning generation and diversify supply also has implications on broader electricity system planning and, in particular, on transmission systems.

21. The existing transmission system had been designed and built in part to incorporate generation from large coal fired generation stations and move this power to urban load centres. The phase-out of coal was pursued by the Government to address the environmental and health costs arising from coal-fired generation. Renewable energy technologies (wind, solar, biomass, and hydro) were pursued for their perceived lower environmental impacts, their potential for economic development, and the belief by the Government at the time that renewable technologies would face little local and community opposition. As time has gone on, policies with respect to renewable energy procurement have had to adjust to ensure economic and operational sustainability and to recognize public and local community opposition to projects.

Dated: February 27, 2014

Rick Jennings

Rick Jennings